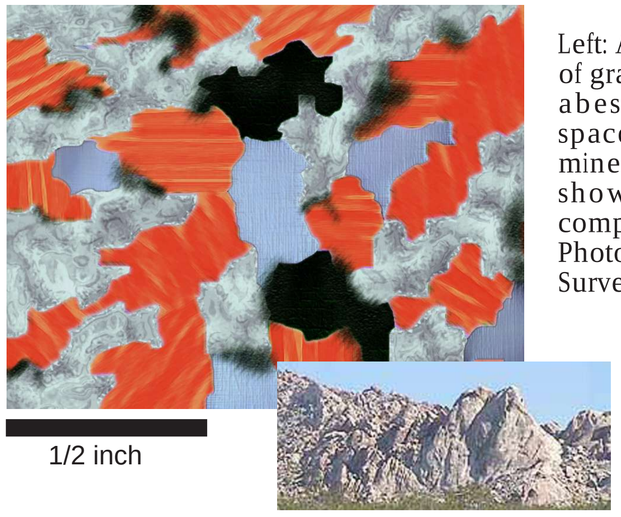
Porosity and Permeability

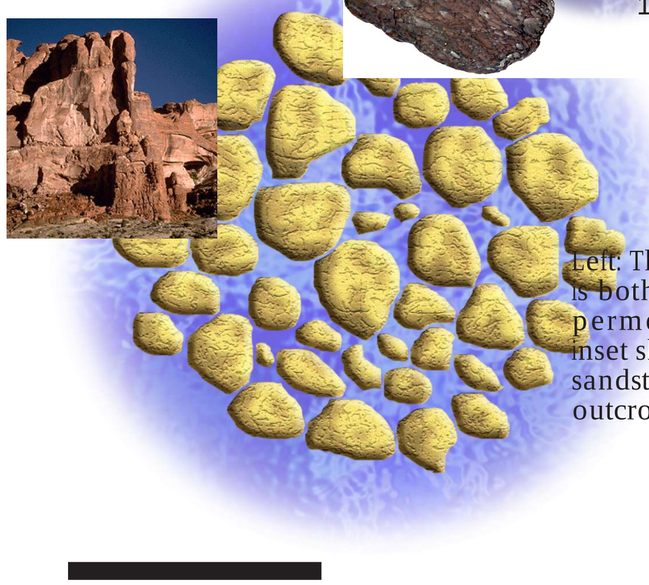
Porosity is a measure of volume of the free space in a rock. Most rocks contain empty space, called pore space, between the mineral grains that make up the rock. You can think of porosity like the holes in a sponge. Some rocks contain much more pore space than others, for example, sandstone composed of evenly sized sand grains contains more pore space than a tightly crystallized granite.

Permeability is a measure of the interconnectedness of pore spaces. A rock may have a high porosity, but if the pores are not connected, the water cannot flow through the rock.



Left: A close up of granite. Notice the abesence of pore space between the mineral grains. Inset shows a mountain composed of granite. Photo-U.S. Geological Survey

Right:: A slice of vesicular basalt. Notice the plentiful pores, however they are not connected. This rock is porous,but not permeable. Inset shows a book-sized piece of vesicular basalt.



Left: This sandstone is both porous and permeable. The inset shows a sandstone outcrop.

Above: Various types of coral that precipitate calcite out of seawater. Over time, this calcite may create limestone and dolostone.

Florida is underlain by a type of rock called carbonate rock. The two types of carbonate rock found in Florida are limestone and dolostone. These rocks form from the skeletons of marine creatures like coral and crustaceans and from the mixing and settling of chemicals in ocean water. Overtime, the minerals are squeezed together to create rock.

Above: Dense, compressed limestone like that found in Pennsylvania and Maryland. This rock has low porosity and permeability unless it is fractured or dissolved. Photo-Pennsylvania Department of Conservation and Natural Resources

Florida's limestone and dolostone are often both porous and permeable. Unlike the carbonate rocks found in many other states, the rocks in Florida have not undergone heavy compaction. In Florida, it is common to still see shell fragments in limestone. Frequently, the loosely cemented limestones in Florida have high porosity and permeability.

Above: Fossiliferous limestone like is common in Florida. Notice the pore space between the shells. A penny is shown for scale.

Both limestone and dolostone are also very soluble, meaning they dissolve in water much more easily than other types of rock. This is yet another way limestone and dolostone achieve such high permeability and porosity. Water can expands cracks and fractures in the rocks. In some places, dissolution has resulted in the formation of natural pipes with diameters of over 100 feet!

Above: This cave is basically one giant pore space. Caves like this can stretch for miles making this limestone unit extremely porous and permeable. Photo-Steve Auer

For Inquires or a copy of the poster
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